

Mfg. S&T Microencapsulation Processing Lab

The Organic Materials Department has developed a unique capability for Sandia with its Microencapsulation Processing Lab. Microencapsulation refers to the process of placing a shell material, composed of a synthetic or biological polymer, completely around another chemical for the purpose of delaying or controlling the release of the core chemical. Common commercial applications of microcapsules include carbonless copy paper, scratch and sniff magazine ads, food flavorings and timed-release drug delivery systems.

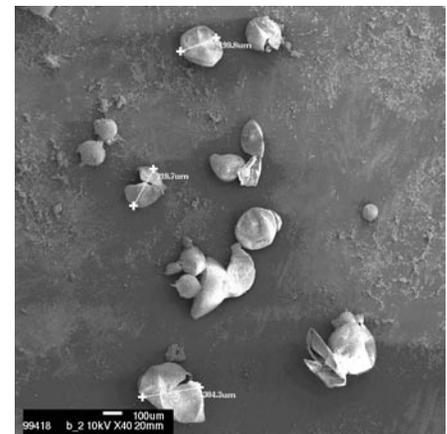
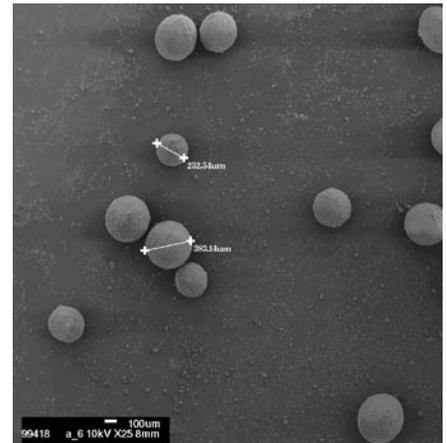
The size of these cell-like plastic packages can range from as small as a micron in diameter to as large as several millimeters in diameter. The top picture (right) is a scanning electron micrograph (SEM) of gelatin-based microcapsules. In this case the microcapsules consist of a protein gelatin shell and a mineral oil core. The bottom picture is a SEM that shows cracks and deformation of the microcapsules shells after being crushed by agitation with a spatula. This crushing process is referred to as a mechanical rupture or pressure release mechanism.

Microcapsules can also be manufactured with shell materials that will allow for other types of core release mechanisms. Such mechanisms are biodegradation, photolysis, chemical reaction, thermal activation, diffusion and solubilization.

To date we have processed microcapsules that contain odorants, catalysts, acids, oils, crosslink agents and irritants for customers having a broad range of applications.

Contact: Duane Schneider (505-844-3161, daschne@sandia.gov)

Christina Crawford (505-284-1237, clcrawf@sandia.gov)



ES&H Lessons from my Favorite General

A message from Gil Herrera, Mfg. S&T Center Director

As anyone who knows me well or has been in my office can attest, one of my personal heroes is General George S. Patton. There are many reasons why I like the crusty General, made famous through success on the battlefield, and infamous by the Academy Award-winning work of George C. Scott in the 1970's movie. Since the purpose of this article is ES&H excellence and not military history, I will forego a lengthy description of Patton's attributes. What I will say is that his speeches were not only extremely motivational, but they contained key themes and concepts designed to keep those under his com-

mand well-trained, high-performing, and safe. Motivated, well-trained, high-performing, and safe sound like four important attributes for everyone in the center.

Those who saw the movie may remember the opening speech. In that he said the following (edited for proper decorum): "All through your Army careers, you men have complained about what you call 'boring drilling.' That, like everything else in this Army, has a definite purpose. That purpose is alertness. Alertness must be bred into every soldier. I don't care for a man who's not always on his toes. You men are veterans or you wouldn't be here. You are ready for what's to come. A man must

be alert at all times if he expects to stay alive."

Little did we know that Patton spoke of ISMS and ISO. Patton tells us that we must plan and be well-trained in order to be safe. This is a particularly important lesson for us today. Our customer is very displeased with our performance in safety. Sandia's days away and reportable occurrence rates are high relative to both commercial industry and other NNSA/DOE facilities. More importantly, we are not creating an environment that is as safe as it could be—we owe this to our employees, peers, and ourselves.

General, Continued, page 3

Employees Honored for ERA Individual and Team Accomplishments

The 2005 Employee Recognition Awards (ERA) were recently announced. ERA is a program sponsored by Lockheed Martin. The Mfg. S&T nominated sixteen teams and twelve individuals for the annual corporate awards. Two individuals and two teams from the Division were selected for the 2005 ERA.

Jane Poppenger

Jane Poppenger was nominated by Doug Abrams and Paul McKey and selected in the Individual Leadership category for her ISO 9001:2000 Quality Leadership for the Manufacturing Enterprise (ME). Jane led the initiative for initial certification and the continuous improvement process in 2004. Jane also led the Manufacturing Enterprise's effort to establish an ISO 9001:2000 Quality Management System. This is an innovative system for Sandia that addresses domestic, international, and DOE Order 414.1A requirements. The ME became the first organization at Sandia to achieve ISO 9001:2000 registration. Jane is a consulting resource for other SNL organizations and the Nuclear Weapons Strategic Management Unit, which is considering this standard to improve its business management system.



Jane Poppenger, Team Leader for Mechanical Measurements (14133-1)

Jane organized individuals from three different departments and a contract facilitator into numerous cross-functional teams to define how the ME conducts its operations. This resulted in the creation of a Quality Management System comprised of a quality manual and two main manufacturing processes supported by twenty-two product and capability processes and twenty-three work instructions. Jane led the ME's continuous improvement processes in addressing changes to security and manufacturing operations in 2004.

She coached her peers and encouraged co-workers to lead and participate on various corrective action teams formed to address improvement opportunities. Communication and teamwork in the ME is greatly improved by having common, well understood procedures, work instructions, and supporting documents that describe how it operates. As a result, employees are better able to consistently address customer requirements, resolve problems

and implement continuous improvement measures on their own. These documented procedures provide a means for training new employees.

Jane is also the chair of the Division 1000 Workplace Enhancement Council (WEC) working with others to create a workplace of the future modeling our corporate values. She lives out her involvement in WEC by promoting teamwork and diversity within her own Mechanical Measurements team. This team is comprised of technical staff, represented trades and students. She mentors the apprentices in the Mechanical Measurements discipline. Jane's leadership has changed the culture of the Manufacturing Enterprise composed of over 160 employees to be more quality conscious. Her leadership has been key to the success of the Manufacturing Enterprise.

Ron Goeke

Ron Goeke was nominated by Robert Poole and selected in the category of Individual Technical Excellence for developing numerous technical programs resulting in enhancing the Center's reputation, establishing partnerships, providing leadership and teamwork in the department's operations



Ron Goeke, Thin Film, Vacuum and Packaging (14152)

Ron is recognized for the quality of his work in his technical area of expertise, as evidenced by the large numbers of diverse customers continuously seeking his work. He provides technical leadership to a wide variety of programs involving many organizations. He is a team player and mentor to new personnel at all levels, readily sharing his expertise and assisting in Department operations. His efforts have enhanced the Center's science and technology reputation and solidified its more traditional prototyping and assembly base.

Ron has continuously provided innovative solutions to complex problems, many of which have had substantial impact on

programs throughout the Laboratory. His recent work on the development of electrical contact coatings for the Silicon Re-entry Switch (SiRES) device was critical to the packaging design of this highly visible Microsystems and Engineering Sciences Application Technology and Operations Prototype (MESA TOP) project, which represents the first Microelectromechanical Systems (MEMS) device on a weapons (W-76) program. Ron has provided leadership in establishing an Atomic Layer Deposition capability, which is an important element in MEMS reliability. He has provided leadership in the development and implementation of thin film deposition on 3D Sensor Packaging (BDYE) flight parts. He has provided technical and programmatic leadership in all areas involving neutron tube development and is a lead member of the Cross Functional Advanced Neutron Tube Team.

Ron has been with Sandia and the Thin Film, Vacuum and Packaging Department for almost ten years. The Department has prospered and grown substantially in recent years and much of this success can be attributed to Ron's strong technical and programmatic contributions. Ron is exceedingly easy to work with and effectively teams with individuals at all levels. He does a superb job of managing and prioritizing numerous projects at once and communicates results and issues well to others.

The Meso-scale Fabrication team

The Meso-scale Fabrication team was nominated by Gilbert Benavides in the team category for supporting the complex by providing micro and meso-scale parts in a variety of materials through meso-machining, rapid prototyping, and dimensional inspection processes. The Meso-scale Fabrication team has been quick to respond to a great number of customers throughout the laboratory. The team is sought after to provide manufacturing advice for challenging meso-scale parts. Their specialty is millimeter size parts with micron size features. Oftentimes the customer has exhausted all other options and yet this team finds a solution. Before starting a job, this team provides the customer with cost and schedule information documentation. The team is pursuing ISO 9001 registration for these processes.

This team is providing weapon component designers with material and manufacturing options to complement silicon MEMS and LIGA (an acronym from German words for lithography, electroplating, and molding) technologies. This



The Meso-scale Fabrication, (L-R) Pin Yang, David Gill, Barry Ritchey, Jeremy Palmer, Gilbert Benavides with Division 14000 Vice President Lenny Martinez. Not shown: Michael Saavedra (team representative), Doug Abrams, David P. Adams, Tony Bryce, Bart Chavez, Andre Claudet, Lynna Esquibel, Marc Harris, Carter Hodges, James Paustian, and Michael Vasile.

team has made significant contributions to the SiRES project and their success has broadened the Mfg. S&T's role in the MESA project. This team represents the best our nation has to offer in areas of micro-EDM, femtosecond laser machining, diamond turning, micro-milling, rapid prototyping, and dimensional metrology.

They are achieving excellence in manufacturing R/D/A by expanding manufacturing capabilities. They are consistently meeting customer expectations by delivering parts on time and within cost. Finally, they are achieving operational excellence by including these advanced manufacturing processes as part of the ISO 9001 registration process. All the while, the team has not compromised safety.

The Wire EDM 6S Event team

The Wire EDM (Electro Discharge Machining) 6S Event team was nominated in the team category by Tim Gardner, in recognition for establishing lean/six sigma momentum within the Mfg. S&T and the Manufacturing Enterprise (ME). This team planned and accomplished a highly successful 6S Event. The 6S represents Sort,

Straighten, Shine, Safety Standardize, and Sustain. This first-of-its-kind event in Building 840 resulted in significant reorganization of activities and equipment, creating a more efficient, highly-visual work space. The team established an important toe-hold of success with respect to the large space and workforce in Building 840. As

a result of this event, this work area became a "showpiece", and has convinced the ME's 130 employees of the potential value of lean/six sigma activities in other work areas. Considering the minimal lean/six sigma experience on this team prior to the event, team members did an extraordinary job of sticking to the mission and working through the required 6S steps in an efficient manner.

Implementation of lean/six sigma methodology to increase the efficiency of administrative and technical work processes is a corporate goal for Sandia and a strategic objective of the NWSMU. Further proliferation of lean/six sigma methodology in the ME can significantly improve space utilization and increase employee/work process efficiency. These concepts can improve Mfg. S&T cost competitiveness versus outside vendors and help maintain/increase business opportunities with both internal/external customers. The precedence established by this event should lead to "Best Practices" in terms of work space utilization, organization, and efficiency that serve as a benchmark for further progress in Building 840.



The Wire EDM (Electro Discharge Machining) 6S Event team, (L-R) Tom Gutierrez, Margaret Rose Sanchez (team representative), Tom Pehr, Robin Ryan, Audrey Gallegos, Tom Chavez, Clarence Esquibel, Dave Schroeder, Mick Gorospe with Division 14000 Vice President Lenny Martinez. Not shown (Doug Abrams, Roy Bonsack, Phap Dinh, Tom Gallagher, Mike Hulett, Rick Sherwood, and Paul Thompson)

General, Continued from page 1

I want to assure everyone in the Center that I believe working safely is of the utmost importance. We must all contribute to our corporate goal of becoming best of class in ES&H performance. I am not saying that our work is of lesser importance; it is not. We must dedicate ourselves to providing the best possible work to our customers—but we must do this work safely.

Perhaps my favorite Patton quote is the following: "Never tell people how to do things. Tell them what to do and they will surprise you with their ingenuity." This is a principle I have tried to live by as I lead the Center. We all strive to define how we do our work. It is an expression of our knowledge and intellect, and a measure of our independence. However, our NNSA customer is losing patience with respect to our safety performance. If we do not improve, I fear we will lose our ability to define how we conduct work. Let's refocus our efforts to planning and conducting work safely, and demonstrate to our NNSA customer that we are worthy of managing our work.

I would like to close with another of my favorite Patton quotes relevant to our present situation: "Accept the challenges so that you can feel the exhilaration of victory." I look forward to working with the entire Center as we strive to achieve victory in creating a safer environment.

—Gil Herrera

Appropriate Dress, Cont. from page 6

all-inclusive for a business environment. Specific job assignments and work sites are factors in determining appropriate attire as well. If you have site-specific questions, you may direct them to your manager/advisor/supervisor.

How an individual presents himself/herself in attire, behavior, or attitude is a statement about the person and the organization he/she represents. The relaxed dress that Sandians enjoy presumes the understanding that employees be well groomed and dressed appropriately for the professional environment.

Sandia's Employee Handbook, page 16, states, "Although Sandia does not have a dress code, you should use common sense and mature judgment in determining appropriate and suitable dress." The manager/advisor/supervisor has the right and responsibility to send an employee home for inappropriate dress.

Again, please accept this message in the spirit it is intended—as an aid in helping you to meet the expectations of your employer and to preclude any unfortunate incident or conflict related to one's business attire.

If you work in or visit clean rooms or areas where corrosives, solvents, rad agents, hazardous chemicals, cryogenic substances or soldering/welding are used/performed please read this note from Sylvia Saltzstein, Division 14000 ES&H Coordinator.

It's summertime again!! We all look forward to this time of year and all of the activities that we enjoy once the temperatures start to rise. However, there are additional safety concerns that are associated with this time of year as well. One of the concerns that has come to our attention again is how personnel will dress in laboratory and contamination "Clean-room" areas.

The clothing you wear should never be considered PPE, but it can make a big difference as to whether you suffer a major or minor injury or illness from an occupational exposure. For instance, a chemical resistant apron works great to prevent acid splashes

Tech Update

Mfg. S&T Center Hosts Technical Capability Meeting

On February 23, 2005, the Mfg. S&T Center hosted a technical capabilities meeting for management and staff of Monitoring Systems and Technology Center (5700). The two centers have had a long and productive working relationship, particularly in the production of sensor modules for satellite applications. These production activities require highly sophisticated 3-D electronic packaging operations, including: (1) high precision solder attachment of a complex ball grid array (BGA) to a collection of low-temperature co-fired ceramic (LTCC) submodules; (2) advanced LTCC processing techniques; and (3) selection and use of advanced organic materials for underfill and encapsulation applications.

This meeting was held at the request of Center 5700 as a way to understand what other Mfg. S&T

capabilities might be successfully applied to their suite of challenging problems. The meeting was organized and hosted by Phillip Cole of the Organic Materials department and included presentations by Center personnel on electronics fabrication, electronic packaging, thin film technologies, focused ion beam (FIB) research, organic materials, ceramic materials, meso-machining, rapid prototyping, laser engineered net shaping (LENS), LTCC technologies, solder processing, and electroplating. In addition, our science and technology programs, ISO implementation efforts, and participation in MESA were highlighted. The meeting was an excellent forum for interactions between the centers and several follow-on activities have been initiated.

Contact: Mike Kelly (505-844-4031, mjkelly@sandia.gov)

from affecting you directly. However, if this acid runs down the apron onto an unprotected leg, the consequences can be a lot more severe. Additionally, there are many chemicals that are used in the Division that can absorb through the skin and cause adverse health effects. And let's not forget about contamination control "Clean rooms" that require workers to "don and doff" protective clothing not only as a PPE item but as a way to reduce contamination. If workers are required to wear a hair net then some type of coverage is needed for legs, etc.

If you work in or visit areas where corrosives, solvents, rad agents, or other hazardous chemicals are used please wear clothing that covers your legs. Additionally, shorts should not be worn in areas where there are thermal

hazards such as soldering, welding or cryogenics. Shorts should not be worn in contamination controlled, "Clean-Room" type areas. Finally, shoes need to protect the toes from something falling off a worktop or bumping a cabinet, so no flip-flops or open toed shoes in these areas.

Care should be taken to wear clothing that protects you from being injured while you are on the job and also to assist in the reduction of contamination.

If you have any questions about this please feel free to contact your Center Coordinator or me.

Contact: Sylvia Saltzstein (505-844-6391, sjsaltz@sandia.gov)

Mark F. Smith Promoted to Level II Manager



Mark Smith demonstrates cold spray technology in this photo from Sandia's 2001 Annual Report

Photo by Randy Montoya

Mark F. Smith has been promoted to Level II Manager, Advanced Manufacturing Process Science and Technology, following Carol Adkins, who has moved to the Science, Technology and Engineering division office.

Mark was formerly Manager of the Joining and Coatings department in the Materials and Process Sciences Center and was one of the principal developers of Sandia's world class thermal spray and cold spray capabilities. Cold spray is an emerging process technology that can spray deposit a wide range of ductile metal powders at very high rates to build up coatings or free standing shapes at or near room temperature without melting or vaporization. It is much like explosive welding, but on a microscale. He also served as principal investigator on one of the first Sandia cooperative R&D agreements, a five-year, \$5 million program with General Motors to develop SprayBore™, a process to rapidly deposit highly wear-resistant coatings onto the cylinder walls of aluminum automobile engines.

Mark joined Sandia in 1981 as a staff member. In 1999, Mark was promoted from DMTS to manager of the Joining and Coatings department, where he

pursued interests in new technology and program development to build an eight-company consortium to support refinement and commercialization of cold spray. Cold spray is now in commercial use, and it is also being evaluated for possible nuclear weapon applications.

"I'm excited to be here," Mark said. "I've spent most of my career at Sandia with an emphasis on process research. Now I'll be focused more on the development side. That's applying science and technology to make real hardware that directly impacts programs here at Sandia and elsewhere. The Center spans the entire range of research, development and application (RDA), with an emphasis on development."

Mark notes that many of Sandia's manufacturing capabilities are unique. In addition to RDA, "We also span a range from the extremely large state-of-the-art machine tools in the Development Shops in building 840, to miniature machining, then down to the meso-scale parts, and then on to techniques where we are manipulating atoms and molecules. We are pushing the state of the art at each of these scales, and that is really interesting and rewarding."

Mark says that one focus at the beginning will be working with the Center to grow business with the Nonproliferation & Assessments and Military Technologies & Applications Strategic Management Units. "In addition to our work with the Nuclear Weapons division, we can provide additional support to those divisions. There's a growing emphasis in the military and other agencies for fast development of products. That also means on-time, on-spec, on-budget delivery. We have a unique set of model-based design, rapid prototyping, and advanced manufacturing capabilities to serve the customers of these divisions.

Mark holds BS, MS, and PhD degrees from Iowa State University in geology, geophysics, and metallurgy, respectively. He is also a co-founder, board member, and former president of the international Thermal Spray Society; founding Chairman of the Editorial Review Committee of the Journal of Thermal Spray Technology; and a Fellow of ASM, International.

Mark enjoys skiing and off-road four-wheeling. "I'm on my seventh or eighth Jeep," he admits.

—Peter Nolan

March Winds and Fires Don't Mix

Everybody has heard about March winds in New Mexico—I found out that they happen in April as well. I also discovered the expertise of the Isleta Pueblo Volunteer Fire Department. In early April, my brother and I decided to burn a few weeds, a small task that was supposed to take about thirty minutes.

We were burning weeds across the street from my house in what used to be my grandfather's old orchard. On the south end of the orchard was an old-time wooden chicken coop. I have a saying that I've used for years, "The best time to burn weeds is when it's windy. That way you can light it and stand back and watch."

On this particular day that saying came back to burn me. We had gathered and set on fire a few piles of very dry weeds and debris, then moved to start burning further down the fence line. I looked back and noticed that the fire had jumped from a pile to the coop structure. I told my brother to throw some sand on the fire to knock it down while I went for some water. I took about 20 steps and looked back and saw that the flames had climbed up one entire side of the coop. My 5 gallons of water would have done little good.

Being bull-headed, I grabbed my shovel with a scoop of sand and proceeded to the coop to toss it at the fire. No luck, by this time the coop was completely engulfed. The flames were at least 40 feet high and the smoke so black from a railroad tie frame that it created a billowing cloud and darkness equivalent to an eclipse. This happened all within minutes, it seemed. We decided to step back and



Daryl Reckaway (center) smiles a bit sheepishly as his local fire department uses a bit more than a 5-gallon pail of water and a shovelful of sand to douse a wildfire.

let the coop go as I had been planning to tear it down anyway, just not on this particular day. At that point, the range rider pulled in and said, "Looks like you boys need some help". People who know me will understand my next comment, "Not really." He called the fire department anyway; good thing too, because by this time the fire had jumped to some stacked boards and, with fresh fuel, the fire could have burned for a good long time.

The fire department arrived with me standing next to my weed burner and propane tank. Of course, the first volunteer to show up was my neighbor to the north—he is the fire chief. At this point, I was a bit embarrassed. I then realized

that people in my neighborhood had lined up at their fences to watch the fire department arrive. The fire chief asked me, "Need some help?" I replied, "Not really".

They helped anyway.

In the end I had two fire trucks, 4 volunteer firemen, about 1800 gallons of water and 2 hours of time used on the fire. I was sure happy they had helped. The neighbors have asked why they hadn't been invited to the chicken barbecue. We hadn't kept chickens in that coop for many years.

Contact: Daryl Reckaway (505-844-5705, derecka@sandia.gov)

Appropriate Dress for Sandia National Laboratories

Although Sandia National Laboratories has no dress code *per se*, it is important that all employees recognize the magnitude of Sandia's public profile and that the work environment is to a large extent conservative. So information provided here is intended to help you meet the expectations of not only Sandia as your employer today, but the corporate world in general.

Every summer someone in the Student Internship Programs offices has received phone calls and other communications from managers, staff members, even a Vice President, about a few students who

reported to work at Sandia dressed more for school or recreation than for professional experience at a world renowned science and engineering research facility.

What is considered appropriate for a routine workday at Sandia? Generally, clothing that is typically defined as business casual, such as chino "Dockers"-type pants and collared shirts, dresses/skirts of modest length, and slacks with tasteful shirt or blouse, is appropriate. There may also be occasion for a business suit/sport coat.

Clothing which exposes bare back and midriff, cutoffs, short shorts and

skirts, halter and crop tops, strapless, or "spaghetti strap" garments, baggy or ragged, torn jeans or overalls, tank tops, mesh and see-through clothing or lack of undergarments are examples of attire not considered appropriate for any work site at Sandia.

The Occupational Safety and Health Administration governs all work at Sandia. In some cases, certain body piercing could be an issue, and you could also be required to wear closed-toe shoes.

These examples are provided to help you in your wardrobe selection; however, they are not to be considered

Dress, Continued Inside, page 4

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND2005-3060P